

PSYCHE.

DESCRIPTION OF THE PREPARATORY STAGES OF *APATURA ALICIA*.

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EGG. — Nearly spherical, flattened at base; marked by 20 vertical ribs, between which are many fine, horizontal striae; color pale yellow-green. Duration of this stage 3 to 4 days.

YOUNG LARVA. — Length 2 mm.; cylindrical, tapering slightly from segment 2 to 13: color pale green; covered with minute concolored tubercles, each of which sends out a white hair. As the stage proceeds, the color changes to deep green, and at the extreme edge of dorsal area appears a whitish line, and another along base over feet; under side, feet and legs green; head broader than body, sub-globular, a little depressed at top; color dark brown. Duration of this stage 3 to 4 days.

After 1st moult. — Length 3.6 mm.; tapering from segment 2, and ending in two short, conical, divergent tails; color uniform dark green, and sprinkled uniformly over back and sides with fine yellow tubercles, distinctly separated, each giving out a short hair; two sub-dorsal lines, composed of same fine tubercles, but close set, pass from head to the ends of the tails; on middle of side is a wavy line of

similar tubercles, and below the spiracles is another line, straight; the ends of the tails rather roughly tuberculated, with longer hairs, pointing backward; head twice as broad as segment 2; subquadrate, the base nearly square, the sides rounded, the top depressed in front at the suture; on each vertex a stout process or horn, divergent, tapering, 0.5 mm. long, ending in two equal, divergent forks, the length of these being about two-fifths the length of the whole horn; the forks are even sized till near the top, then bluntly conical; behind the horn is a short spine just below the fork, and five small ones around it half way down; along top of head two prongs between the horns, and another back of each. On the side of face, back, are two prongs, each bent down, the upper a little below base of horn measuring 0.38 mm., the other about half as long; whole surface densely and shallowly pitted, and covered with a fine whitish down; all the horns and spines beset with long white hairs, which, from the tips, form pencils; color of front face whitish-green, the top for a narrow space, brown, and a little brown below horns, on the side; the back

of head green; the horns brown in front, green behind; the space along back head and on side green; ocelli black. Duration of this stage about 5 days.

After 2d moult. — Length 7.6 mm.; shape as before; color uniform dark green; all the lines as before; head as before; the horns 1 mm. long to end of forks, the forks being about one-third of this; below each horn on side of face a very short cone; down side of face are now fine spurs, the upper one longest, the rest gradually diminishing to a very short one quite at base; other spurs as before; the color of head varies in individuals, the upper front face and the front of horns being always dark brown, the rest of face greenish-white. In some examples the brown extends half way down, fading into vinous at its lower edge; in one a pale brown stripe extended from base of horn at side to the outer end of mandibles; the back of head always green; the spurs green, the longer ones usually brown at tips. Duration of this stage 3 days.

After 3d moult. — Length 14 mm.; body white in the middle; color more yellow, of one shade; the tubercles and all lines as before. In one example, as this stage proceeded, a minute yellow spot appeared on the anterior edge of each segment from 6 to 11, on dorsal line, but in the others these spots did not appear till the subsequent moult. Head shaped as before, with the processes and spurs as at preceding stage; colors variable. Most have the upper part and front horns vinous-brown, with a slight brown stripe from below horns to end of mandibles, and a

shorter one down side to top of the ocelli. One had the green restricted to a little space in front, and a little stripe on side between the two brown stripes before spoken of; another had all the face green, the horns alone being brown; another has a narrow rim of brown along the top, and two side stripes. In all the front of horns is brown, green behind, and the green spurs or prongs behind have brown tips. To next moult 4 days.

After 4th moult. — Length 21 mm. In from 4 to 11 days after the moult the larvae pupated.

MATURE LARVA. — Length ♂ 29 mm., ♀ 36 mm.; greatest breadth ♂ 6.1 mm., of ♀ 7.6 mm.; stout, thickest in middle, the dorsum greatly arched, tapering pretty evenly either way, so that segments 2 and 12 are of about same diameter; ending in two small, conical, divergent tails, 1.8 mm. long, one placed on each side of the segment, the space between their bases being the convex surface of the segment. Color of whole surface, dorsum and sides, from segment 2 to ends of tails, one shade of yellow-green; next over feet a little bluish, the under side pale; thickly sprinkled with little yellow tubercles, which are distributed equally over whole surface, and are distinctly separated. These are mostly of two sizes, one twice that of the other; some are pointed at top, some rounded, and each gives out a short white hair. There are neither stripes nor bands, but a fine line of tubercles like those elsewhere, but close set, runs from head to end of tail, at each edge of the dorsal area. A similar line below spiracles from segment

3 to 13 ; and on middle of side from segment 7 to 10. Sometimes from segment 6 to 11 is a short oblique line, made up of same tubercles, pointing forward and downward ; on the medio-dorsal line on segments 6 to 11, on the anterior side of each segment, is a little rounded yellow spot, smallest on 6 and 11, and often indistinct, on 7 to 10 clear colored. The largest spot observed measured but 0.08 mm. in diameter. Immediately after the fourth moult all these spots were indistinct, but they became conspicuous as the stage progressed. Feet and legs bluish-green ; head sub-quadrate, about as broad as segment 3, as broad as high, the sides and also the base a little convex, the top deeply depressed in front at the suture ; the vertices conical and each bearing a branching process or horn. These all stout at base, tapering, 2 mm. long, forked near top, the forks being 0.5 mm. long ; about the middle part are set five short conical spurs ; at base behind are two spurs on inner side and one on outer side ; down the side of face three in vertical line, the upper one long, the others gradually diminishing, all bent downward ; between the last of these and the ocelli, a short spur ; many minute spurs are found down back and sides to mandibles ; whole surface of head and horns thickly and shallowly pitted, and covered with a fine whitish down ; the spurs and horns beset with quite long hairs on their sides and tops ; the color of face is variable ; some have it blue-green, vitreous, along the top vinous-brown ; a whitish vertical stripe from inner base of each horn down the suture, and another beginning a little below horn on the side, and running to end of mandibles ; one example had nearly all vinous-brown,

there being merely a little green over mandibles ; in this one even the back of horns and head was brown ; in all others these parts were green, the fronts of the horns brown ; some had the upper part of face vinous, with the fine stripes paler brown ; one had the whole face green, no brown, with fine paler stripes.

CHRYsalis. — Length 23 to 25 mm. ; breadth of the largest at wing cases 8.1 mm., of abdomen 6.6 mm. ; depth of abdomen 9.1 mm. ; compressed laterally ; the outline of ventral side convex ; the abdomen prominent dorsally, much arched, sharply carinated, the carina finely and irregularly serrate and on it the anterior edge of each segment is produced and is marked on each side by a shining black dot ; the last segment ending in a long bifurcated pad of hooklets ; the thoracic segments roundly excavated below mesonotum, and the sides there also excavated in the direction of the bases of the wings ; mesonotum angular, a little rounded at summit, with a low and narrow keel ; head case produced, sub-conic, the projections at vertices prominent, sub-pyramidal, bent in at the top ; color delicate yellow-green, thickly covered with pale yellow dots and patches over the abdomen, and beyond, on dorsal side to top of head, with irregular pale yellow inscriptions ; many of these marks also on the wing cases transversely between the nervures ; the neuration of the wings distinct ; a yellow line passes along the keel from the last segment to top of head case, and a little beyond top of mesonotum sends two forks to the projections of head ; another line, but white, passes along the posterior edge of the wing

case until it strikes a white line from last segment along middle of side of abdomen ; on each side of mesonotum a white dot and one on each side of most of the abdominal segments ; the junctions of these segments indicated by a white line. Duration of the stage 9 days.

I described *Apatura alicia*, with plate, in the Butterflies of N. A., 1868, v. 1, p. 135. In 1874, Mr. Riley, in his 6th Mo. Rep., argued at length against the probability of its being a good species, or more than a variety of *A. celtis*. But he closes by saying very fairly, "But all such questions must be left to the future to decide ; meanwhile Mr. Edwards' opinion is, in one sense, as rightly held as Mr. Scudder's or mine."

Mr. Scudder, in his Synonymical list, 1875, put *A. alicia* as a synonym of *A. celtis*, not even crediting it as a possible variety.

The only way, therefore, to settle the point, was to breed this form from the egg, and for several years I have made every effort to do so, and at last have succeeded. I received from a correspondent in south-eastern Florida several examples of the butterfly early in the season of 1880, and I urged him to attempt getting eggs by enclosing a female in a bag over a limb of any species of *Celtis* tree found there. This was done, and seven eggs were forwarded to me by mail. I received two larvae from these eggs, hatched on the road, on 15 June. The eggs were laid on *Celtis integrifolia* Chapman, but the larvae fed readily on *C. occidentalis* here. One escaped after its second moult, but the other went on to chrysalis.

On 17 August, I received several more

larvae from eggs obtained in the same manner. They were near the first moult when they came, and began to pass it on 19 August. Of these I raised five to imago ; some died. And examples at every stage were put in alcohol.

The larva after first moult is distinct from that of *A. celtis*. It is uniform dark green, sprinkled with separate yellow tubercles, which are equally distributed over whole upper surface—dorsum and sides ; on each side of dorsal area is a fine line of same tubercles close set, from head to the end of the tail ; on middle of side a wavy line, and below spiracles a straight one ; the face is pale green, along the top brown, the back dark green ; the horns are brown in front, green behind ; the single spurs along back of head are all green ; the horns are all larger, more tapering, and branches shorter than in *A. celtis*.

A. celtis after first moult has the dorsum occupied by a band composed of yellow tubercles, a space in middle of this band on posterior half of each segment from 2 to 13, being green ; the sides are green, and the line on side is crenated, not wavy ; along base a straight line as in *alicia* ; the face is either black or purple or green ; the horns are green ; the ends of the spurs usually purple or black.

Each species preserves these characteristics through the next stages. After the fourth moult (the last stage), *alicia*, as already described, is always of one shade of color over back and sides—yellow-green ; covered uniformly with small, separated tubercles ; there are two sub-dorsal lines as before described, and the wavy line on side has given place to an oblique mark on segments 6 to 11 ; there is no medio-

dorsal line or stripe, but on the anterior edges of segments 6 to 11 is a little narrow yellow spot on each.

A. celtis is yellow green over dorsal area, blue-green on the sides; in middle of dorsum is a pale yellow stripe, and on this a deep yellow oval spot is set on the anterior end of each segment from 3 to 12 or 13; sometimes the stripe is wanting, but the spots are always present; these are larger than any on *alicia*, each occupying more than half the breadth of the segment.

These differences in the larvae are decisive of the distinctness of the butterflies. The eggs are alike; the chrysalids are closely alike. Mrs. Peart, who has made drawings of both chrysalids, has called my attention to the serrated edge of the carina on abdomen of *alicia*, as being different from that of *celtis*, which the drawings represent as evenly edged, but I do not happen at present to have a chrysalis of *celtis* at hand for more exact comparison.

LARVA OF *EURYCREON RANTALIS* GUEN.

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THE LARVA of *Eurycreon rantalis* is reported by Prof. F. H. Snow to have caused serious injury to various garden vegetables, weeds and other low and tender plants (a list of which is given below), in Kansas, in June and July, and a description of the larva is given by him in the *Lawrence (Kans.) daily journal*, 28 July 1880. To preserve this description from loss or render it more accessible to entomologists generally, it is here reproduced, with Prof. Snow's permission:—

Head pale yellowish red without spots. Body nearly cylindrical, about 25 mm. long. Color, light green with a narrow yellowish white band on each side of dorsal surface except on second segment. Segment 2 (the head is segment 1) has a single short longitudinal jet black dash between dorsal and stigmatic surfaces on each side, with traces of a second and third spot in some individuals. Segments 3 and 4 have each two such spots on each side. Segments 5 to 12 inclusive have each three circular jet black spots on each side at the

vertices of the angles of an imaginary equilateral triangle having two angles on the anterior half of the segment and one on the posterior half. In some individuals these black spots are minutely pupiled with light green. From the lower of the three spots proceeds a single central yellowish hair. Below this lower spot upon each side of each segment may be detected an exceedingly minute black dot, which would easily escape the ordinary observer. The thirteenth or anal segment has two large black spots on dorsal line and one small black spot on each side. The lower surface of each segment has a transverse series of eight annular black spots. The second, third, and fourth segments have each a pair of true legs, and segments 7, 8, 9, 10 and 13 a pair of prop legs.

The plants upon which this larva was found are: Sweet potato (*Ipomoea batatas*), alfalfa (*Medicago sativa*), beets (*Beta vulgaris*), peas (*Pisum sativum*), pigweed (*Amarantus*), purslane (*Portulaca oleracea*).